

REMARKS

In the February 12, 2004, fourth Office Action in this application, the United States Patent and Trademark Office withdrew the rejection of Claims 4, 9, 13, and 14-19 under 35 U.S.C. § 112, second paragraph, as being indefinite. Claims 1, 3-5, 7-9, and 11-14, 16-19 were rejected under 35 U.S.C. § 103(a) as being unpatentable in view of the teachings of U.S. Patent No. 5,619,710, issued to Travis, Jr., et al. (hereinafter "Travis et al."), and further in view of the teachings of U.S. Patent No. 6,557,165, issued to Nagashima et al. (hereinafter "Nagashima et al."). Claims 2, 6, 10, and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable in view of the teachings of Travis et al. taken in view of the teachings of Nagashima et al. and further in view of the teachings of U.S. Patent No. 5,737,611, issued to Vicik (hereinafter "Vicik").

Prior to discussing in detail why applicant believes that all of the claims in this application are allowable, a brief description of applicant's invention and a brief description of the teachings of the cited and applied references are provided. The following background and the discussions of the disclosed embodiments of applicant's invention and the teachings in the cited and applied references are not provided to define the scope or interpretation of any of the claims of this application. Instead, such discussions are provided to help the Office better appreciate important claim distinctions discussed thereafter.

Background of the Invention

Programs are typically created in an application development environment using an application development language. An application development environment is an integrated suite of applications for use by software developers to create programs. Typical components of application development environments include a compiler, a file browsing system, a debugger, and a text editor for use in creating programs. An application development language is a computer language designed for creating programs.

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS^{LLC}
1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

As programs have become increasingly complex, programming environments are becoming a factor in the length of time it takes to create new programs and the number of bugs that occur as new programs are executed in conjunction with other programs. Traditionally, programs are developed in a linear manner. Unfortunately, a linear programming environment is often undesirable when highly complex computer programs that must run concurrently with other programs are to be developed. Another programming environment is the message-driven environment. In a message-driven programming environment, different objects interface with other objects via messages. Such messages typically are complex structures. To use such messages, the context must be unpacked from a message prior to the execution of an action. The message-driven programming environment as well as the linear programming environment are fragile and render development of programs that must run concurrently with other programs potentially more difficult and bug-laden than is desired.

Summary of the Invention

The present invention as summarized below focuses on an application development environment, which in other words is a programming environment. Applicant's invention is directed to improving the development of programs so that programs may be developed in a more efficient and bug-free manner. To solve or to reduce the foregoing problems, applicant's invention provides an asynchronous programming environment. More specifically, applicant's invention provides a dynamic object storage scheme for storing a plurality of objects, a dynamic dispatch scheme based on the plurality of objects, and an object recognition scheme to describe the plurality of objects. The dynamic object storage scheme stores the plurality of objects so that each object can be accessed as necessary by different threads within the asynchronous programming environment. The dynamic object storage scheme is dynamic in that objects can be created and removed as necessary during the execution of tasks within the asynchronous programming environment. The dynamic dispatch scheme is designed to invoke an action based

on the plurality of objects stored by the dynamic object storage scheme. Each action that is invoked by the dynamic dispatch scheme falls into one of a plurality of categories. Actions may be classified differently at different times.

The plurality of categories include three categories—actions needing precisely one object, actions needing more than one object, or actions not needing an object at all. Actions needing precisely one object include message handlers, and other actions that do not need any object for their execution are generally used to create objects, such as default constructors and real-time routines. Actions that require multiple objects for their dispatch generally combine objects and perform tasks as designed by the programmer.

Other aspects of the present invention include an object recognition scheme that describes the plurality of objects stored by the dynamic object storage scheme. The description of objects allows the asynchronous programming environment to determine whether a described object fits the needs of an application programming interface. In other words, when an application programming interface is presented to the asynchronous programming environment, it is not always clear which objects in a depository of objects fit the presented application programming interface. The object recognition scheme of the present invention allows one or more objects to be identified, thereby determining the suitability of one or more objects to the requirements of the application programming interface.

Unlike prior programming environments, an asynchronous programming environment allows thread-agnostic programs to be developed. Such programs have symmetric multithreading capabilities, i.e., they can be scaled to use the most of available processor processing power. Symmetric multithreading is expected to reduce instruction cache misses on hardware implementations that handle multiple instruction streams at once. An asynchronous programming environment is more efficient than a message-driven programming environment because execution is driven via presence of objects so that little or no translation is needed to

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CHRISTENSEN O'CONNOR JOHNSON KINDNESS^{PLC}
1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

recover context of execution. These attributes of an asynchronous programming environment allow programs to be developed in a more efficient and more bug-free manner.

Summary of Travis et al.

Travis et al. is directed to a system for invoking a method of an application across a network. The network of Travis et al. contains several platforms connected by the network. Each platform includes a central processing unit and memory. Running on each central processing unit of each platform is an operating system (e.g., VMS, ULTRIX, and MS-DOS), applications, and an application control architecture services (ACAS) software component. The ACAS software components of the various platforms of Travis et al., via an object-oriented technique, allow one application on one platform to invoke a method of another application on another platform. The memory of each platform contains information for a global class database which is shared by all platforms over the network.

The system of Travis et al. organizes applications, data of applications, and operations on data of applications into object-oriented classes, which include class objects, method objects, and instance objects. An example of an instance object is a specific file, such as a file called MYFILE. The file MYFILE is operated on by a specific WRITE application. Because MYFILE is a specific file, it is not handled by the ACAS software components. MYFILE belongs to a class of compatible files, such as ASCII_FILE, which is handled by the ACAS software components. Similarly, the specific WRITE application is not handled by the ACAS software components. Instead, the specific WRITE application belongs to a class of applications called ALLWRITE, which in turn is handled by the ACAS software components. Applications can be characterized by the class objects to which the applications belong, by the method objects which support the operations in a particular application, and by instance objects upon which the method objects can operate.

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CHRISTENSEN O'CONNOR JOHNSON KINDNESS^{PLC}
1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

Each instance object is associated with a class object. An instance object is manipulated by one class object (a first application) sending a message to another class object (a second application). The message might be an action, such as EDIT, READ, or PRINT. Messages are supported by the class objects. This means that the interpretation of a message depends upon the classes to which the instance objects in that message belong. For example, a PRINT message may be interpreted differently if the instance object is a text file in a class object TEXT_FILES as opposed to an instance object that is a color graphics file in a class object COLOR_GRAPHICS. Thus, messages are the interfaces between a class object (an application) and method objects (operations of the application). Messages are used against an application to specify types of operations the application can perform on the instance objects. The messages are generally in the form of a selector of an operation, such as PRINT, along with several parameters (e.g., STRINGS, NUMBERS, etc.). A message does not describe the implementation of a particular operation. It only represents the interface to the implementation of the particular operation. Thus, to find a particular operation (the method object) that is called by a particular message, one must not only examine the message but also the class of the instance object. To cause a specific action to occur, the message must be mapped to actual executable program code. This mapping occurs by finding the particular message which corresponds to the particular class of the particular instance and then finding the particular method which corresponds to the message supported by the class. The method represents the actual executable program code to implement the desired operation of the message on the instance.

To understand Travis et al., it is essential that the technical differences between a class and an object be made. A class is a descriptive tool used in a program to define a set of attributes or a set of services (actions available to other parts of the program) that characterize any member (object) of the class. Program classes are comparable in concept to the categories that people use to organize information about their world, such as *animal*, *vegetable*, and *mineral*, that define the

types of entities they include and the ways those entities behave. On the other hand, an object is an instantiation of a class and is capable of executing. But not a class because a class is a named collection of attributes and services, which is not capable of executing. Travis et al. misuses the word "class object" and "method object" to mean a "class." For Travis et al., the term "instance object" means "object" in the traditional sense that an object is an instantiation of a class. See column 6, lines 31-42, among other places, where Travis et al. redefines the meanings of the term "object."

The implication of these technical differences is huge. For example, Travis et al. teaches that "[t]he class ... would then be the class for several instances, but the instances are not ... managed by the object-oriented architecture." See column 9, lines 14-16. As another example, Travis et al. teaches that "[t]he class database consists of two types of objects [which] are either classes ... or methods" See column 10, lines 33-34. Note that Travis et al. does not mention instance objects or data as being objects stored by the class database. As a further example, Travis et al. teaches that "[t]he global class database ... is not meant to store application instance data because preferably applications completely manage their own sets of application instance data." See column 13, lines 55-60. The implication of this is that no instance objects are stored by Travis in the global class database. But there is more. Travis et al. teaches the following:

The loader/unloader software component...is activated by a user wishing to transfer class information in local class database...to the global class database...The transfer makes information previously accessible only to the platform accessible to all network users through class database.... Transfer of class information from the local class database...to the global class database is preferably achieved by sending class and method object definitions in an

ASCII format to the load/unloader software component...for loading into the global class database.

See column 16, lines 32-48.

If class objects and method objects are executable units, it is difficult to understand how they could be transferred in ASCII format from a local class database to a global class database. Thus, the class objects and the method objects of Travis et al. are textual in form and not executable.

Summary of Nagashima et al.

Nagashima et al. is directed to a system for enhancing reuse of software and its running speed. The system of Nagashima et al. includes an object-oriented programming supporting apparatus for coupling a plurality of objects, each having data and operation with each other. The supporting apparatus comprises a display means, an object coupling means, a hierarchical structure construction means, and a handler. Focusing on the display means, objects are displayed by presentation of a block, a data output terminal for expressing the capability of transferring data of the object to another object, a data input terminal for expressing the capability of receiving data from another object, a message terminal for expressing the capability of receiving a processing request from another object to execute a method. Each object can be represented by a hierarchical structure which permits one or a plurality of objects to exist in a single object, and in addition, displays a wiring for coupling terminals of a plurality of objects.

Summary of Vicik

Vicik is directed to a method for dynamically escalating locks on a shared resource. When the number of low granularity locks exceeds a plurality of escalation threshold parameters, allocated low granularity locks for a particular (process) are escalated to a higher granularity lock and thereby free the low granularity locks for re-use by other processes. The plurality of escalation threshold parameters permit more flexible tuning of escalation criteria as compared to

prior techniques. The escalation threshold parameters may be varied according to the needs of particular computing systems, performance criteria, or other considerations.

The Claims Distinguished

As discussed in greater detail below, the claims of the present application are clearly patentably distinguishable over the teachings of the above-cited references. The present invention is directed to provide an asynchronous programming environment, which solves or reduces problems associated with prior programming environments. Applicant's invention provides a dynamic object storage scheme for storing a set of objects, a dynamic dispatch scheme based on the set of objects, and an object recognition scheme to describe the set of objects. The dynamic object storage scheme stores the set of objects so that each object can be accessed as necessary by different threads within the asynchronous programming environment. The dynamic object storage scheme is dynamic in that objects can be created and removed as necessary during the execution of tasks within the asynchronous programming environment. The dynamic dispatch scheme is designed to invoke an action based on the plurality of objects stored by the dynamic objects storage scheme. The action that is invoked by the dynamic dispatch scheme falls into one of a plurality of categories. Action may be classified differently at different times. The plurality of categories of actions include three categories:-actions needing precisely one object, actions needing more than one object, or actions not needing any object at all. Actions needing precisely one object include message handlers, and other actions that do not need any objects for the execution are generally used to create objects, such as default constructors and real-time routines. Actions that require multiple objects for the dispatch generally combine objects and perform tasks as designed by the developer. The object recognition scheme describes the set of objects stored by the dynamic objects storage scheme. The description of objects allows the asynchronous programming environment to determine whether a described object fits the needs of an application programming interface. In other

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS^{PLC}
1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

words, when an application programming interface is presented to the asynchronous programming environment, it is not always clear which objects in a depository of objects fit the presented application programming interface. The object recognition scheme of the present invention allows one or more objects to be identified, thereby determining the suitability of one or more objects to the requirements of the application programming interface.

Regarding the claims, independent Claim 1 is directed to an asynchronous programming environment. The environment is recited as comprising a dynamic object storage scheme for storing a plurality of objects. The environment further comprises a dynamic dispatch scheme for invoking an action that belongs to one of a plurality of categories. The plurality of categories includes needing one object, needing more than one object, and needing no object. The environment yet further comprises an object recognition scheme for providing a description of each object of the plurality of objects. The description allows a determination of whether an object described by the description fits an application programming interface.

Claims 2-4 are dependent from independent Claim 1 and are directed to further limitations of the environment described above. Claim 2 is dependent on Claim 1 and recites that in the plurality of objects as stored via the dynamic object storage scheme are accessible utilizing a recyclable locking mechanism. Claim 3 is dependent on Claim 1 and recites that the plurality of objects as described via the object recognition scheme, each comprises a series of tokens, and each token in turn relates to an attribute of the object. Claim 4 is dependent on Claim 1 and recites that the dynamic dispatch scheme provides for execution of objects based on unpacked-into-messages events.

Independent Claim 5 is directed to a method, and the method is recited as comprising storing a plurality of objects via a dynamic object storage scheme. The method further comprises dispatching at least one of the plurality of objects via a dynamic dispatch scheme based on events from at least one of the plurality of objects. The dynamic dispatch scheme is

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CHRISTENSEN O'CONNOR JOHNSON KINDNESS^{PLC}
1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

capable of invoking an action that belongs to one of a plurality of categories. The pluralities of categories include needing one object, needing more than one object, and needing no object. The method yet further comprises describing each of the plurality of objects utilizing an object recognition scheme. The object recognition scheme provides a description of each object of the plurality of objects. The description allows a determination of whether the object described by the description fits an application programming interface. Claims 6-8 are dependent from independent Claim 5 and are directed to further limitations of the method described above. Claim 6 is dependent on Claim 5 and recites that the act of storing a plurality of objects via a dynamic objects storage scheme comprises accessing one of the plurality of objects utilizing a recyclable locking mechanism. Claim 7 is dependent on Claim 5 and recites that the act of describing each of the plurality of objects utilizing an object recognition scheme comprises describing each of the plurality of objects as a series of tokens. Each token relates to an attribute of the object. Claim 8 is dependent on Claim 5 and recites that the act of dispatching at least one of the plurality of objects via a dynamic dispatch scheme comprises executing at least one of the plurality of objects based on unpacked-into-messages events.

Independent Claim 9 is directed to a computer, and the computer is recited as comprising a processor; a computer-readable medium; and an asynchronous programming environment being executed by the processor from the computer-readable medium. The environment is recited by independent Claim 9 as comprising a dynamic object storage scheme for storing a plurality of objects. The environment is further recited as comprising a dynamic dispatch scheme based on an event from at least one of the plurality of objects for invoking an action that belongs to one of a plurality of categories, the plurality of categories including needing one object, needing more than one object, and needing no object. The environment yet further comprises an object recognition scheme for providing a description of each object of the plurality

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CHRISTENSEN O'CONNOR JOHNSON KINDNESS™
1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

of objects. The description allows a determination of whether an object described by the description fits an application programming interface.

Claims 10-13 are dependent from independent Claim 9 and are directed to further limitations of the computer described above. Claim 10 is dependent on Claim 9 and recites that the plurality of objects as stored via the dynamic object storage scheme are accessible utilizing a recyclable locking mechanism. Claim 11 is dependent on Claim 9 and recites that in the plurality of objects as described via the object recognition scheme, each comprises a series of tokens, and each token in turn relates to an attribute of the object. Claim 12 is dependent on Claim 9 and recites that the dynamic dispatch scheme provides for the execution of objects based on unpacked-into-messages events. Claim 13 is dependent on Claim 9 and recites that the medium comprises a piece of memory.

Independent Claim 14 is directed to a computer-readable medium that has a computer program stored thereon for execution on a computer. The computer program is recited by independent Claim 14 as providing an asynchronous programming environment. The environment comprises a dynamic object storage scheme for storing a plurality of objects. The environment further recites a dynamic dispatch scheme based on events from at least one of the plurality of objects for invoking an action that belongs to one of a plurality of categories, the plurality of categories including needing one object, needing more than one object, and needing no object. The environment yet further recites an object recognition scheme for providing a description of each object of the plurality of objects. The description allows a determination of whether an object described by the description fits an application programming interface.

Claims 15-19 are dependent from independent Claim 14 and are directed to further limitations of the computer-readable medium described above. Claim 15 is dependent on Claim 14 and recites that the plurality of objects as stored via the dynamic object storage scheme are accessible utilizing a recyclable locking mechanism. Claim 16 is dependent on Claim 14 and

recites that in the plurality of objects as described via the object recognition scheme, each comprises a series of tokens, and each token in turn relates to an attribute of the object. Claim 17 is dependent on Claim 14 and recites that the dynamic dispatch scheme provides for execution of objects based on unpacked-into-messages events. Claim 18 is dependent on Claim 14 and recites that the computer-readable medium comprises a Compact Disc Read-Only Memory (CD-ROM). Claim 19 is dependent on Claim 14 and recites that the computer-readable medium comprises a floppy disk.

As noted above, the fourth Office Action rejected Claims 1, 3-5, 7-9, 11-14, and 16-19 under 35 U.S.C. § 103(a) as being unpatentable in view of the teachings of Travis et al. and Nagashima et al. Claims 2, 6, 10, and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable in view of the teachings of Travis et al., taken in view of the teachings of Nagashima et al., and further in view of the teachings of Vicik. As also noted above, applicant respectfully disagrees. The cited and applied references simply fail to teach all of the limitations of the independent claims, much less the recitations of many of the dependent claims.

Focusing on Claim 1, there is no teaching or suggestion in the cited references for an asynchronous programming environment in the manner recited in Claim 1. Claim 1 recites that the environment comprises a dynamic object storage scheme for storing a plurality of objects. The remaining recitations of Claim 1 are directed to a dynamic dispatch scheme for invoking an action that belongs to one of a plurality of categories. The plurality of categories are recited by Claim 1 to include needing one object, needing more than one object, and needing no object. Claim 1 also recites an object recognition scheme for providing a description of each object of the plurality of objects. The description allows a determination of whether an object described by the description fits an application programming interface. The cited and applied references have failed to teach the concept of a dynamic dispatch scheme for invoking an action that

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CHRISTENSEN O'CONNOR JOHNSON KINDNESS^{PLC}
1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

belongs to one of a plurality of categories (which includes needing one object, needing more than one object, and needing no object), among other things.

Travis et al. describes a mechanism where client applications can remotely invoke other applications by sending globally recognized (network wide) messages with parameters. Using the name of the message and information about certain parameters and certain preference information, one method object is selected from a database. Other information in the database can be used to locate and execute the actual code to implement the method object. The action represented by the message is resolved into one method object and executes as specified in the message. The Office has recognized this deficiency of Travis et al. by noting that "Travis is silent with respect to the plurality of categories that include needing more than one object." See the Fourth Office Action, p. 3, paragraph 3.

In contrast, applicant's invention recites, among other things, a dynamic dispatch scheme for invoking an action that belongs to one of a plurality of categories. The plurality of categories includes needing one object, needing more than one object, and needing no object. Whereas the system of Travis et al. invokes one method object in response to a message, the dynamic dispatch scheme of various embodiments of the present invention allows the invocation of an action that belongs to one of a plurality of categories, including needing one object, needing more than one object, and needing no object. Among other things, the system of Travis et al. has failed to invoke an action that needs more than one object.

Travis et al. specifically states that in response to a message requesting a method invocation from an application or user, a client application determines the proper method to be invoked by retrieving information from a class database, comparing the retrieved information with user preferences, and selecting the proper method based upon the comparison. Server connection and startup processes locate a platform capable of executing code associated with the

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1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

selected method. In other words, the system of Travis et al. is not designed to invoke an action that requires multiple objects.

The system of Travis et al. completely lacks other features recited by the claimed invention. For example, the Office has failed to show and applicant is unable to find where Travis et al. teaches or suggests "a dynamic object storage scheme for storing a plurality of objects" as recited in Claim 1 among other claims. As discussed before, the system of Travis et al. stores classes but not objects. Travis et al. uses the structure of classes and the information provided by the classes so as to allow an application from one platform to invoke a method of another application running on another platform. But no objects are stored by Travis et al. The confusion stems from the misuse of the word "object" by Travis et al. at times to mean "class."

This confusion must be dispelled to understand Travis et al. To illuminate, suppose for the sake of argument that the class databases of Travis et al. can store executable objects. It is difficult to understand how an object compiled for the VMS operating system can be executed on the MS-DOS operating system. Thus, no objects are stored or can be stored in the class databases of Travis et al. The reason Travis et al. uses the class databases is to allow a client application on one platform to invoke a function by a server application on another platform. In contrast, applicant's claimed invention recites "a dynamic object storage scheme for storing a plurality of objects." No dynamic object storage scheme is provided by Travis et al. which is contrary to applicant's claimed invention.

The Office cited Nagashima et al. for the teaching of "a dynamic dispatch scheme for invoking an action that belongs to one of a plurality of categories, the plurality of categories including needing one object, needing more than one object, and needing no object" as recited in Claim 1. This cannot be correct. The Office explained that the hierarchical structure discussed by Nagashima et al. somehow teaches the dynamic dispatch scheme that can invoke an action belongs to a category of needing more than one object. Nothing about the teachings of

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1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

Nagashima et al. has anything to do with a dynamic dispatch scheme as recited in Claim 1. Each object is spawned from a class, which potentially inherits its attributes and services from a hierarchical structure of classes. But an object is still one object. For example, a person is one person and it is ludicrous to view a person as comprising a plurality of persons.

Given the defects of Travis et al. and Nagashima et al., there would be no benefit to combine Travis et al., Nagashima et al., and Vicik, each alone or in combination. Even if the combination were possible, which assumption applicant specifically denies, the combination still would not teach applicant's claimed invention.

Clearly, Travis et al., Nagashima et al., and Vicik, alone much less in combination, teaches or suggests the subject matter of Claim 1. More specifically, none of these references, alone much in combination, teaches or suggests an asynchronous programming environment that has a dynamic dispatch scheme, which invokes an action that belongs to one of a plurality of categories (needing one object, needing more than one object, and needing no object), and an object recognition scheme, which provides a description of each object of the plurality of objects so as to allow a determination of whether an object described by the description fits an application programming interface, as recited in Claim 1.

As will be readily appreciated in the foregoing discussion, none of the cited and applied references teaches or suggests the subject matter of Claim 1. Specifically, none of the cited and applied references teaches an object recognition scheme in the manner recited in Claim 1. As a result, applicant submits that Claim 1 is clearly allowable in view of the teachings of the references.

With respect to dependent Claims 2-4, all of which depend directly or indirectly from Claim 1, it is clear that the subject matter of these claims is also not taught or suggested by the cited and applied references, namely Travis et al., Nagashima et al., and Vicik. Claims 2-4 all add limitations that are clearly not taught or suggested by any of the cited and applied references,

particularly when the limitations are considered in combination with the recitations of the claims from which these claims individually depend. In summary, Claims 2-4 are submitted to be allowable for reasons in addition to the reasons why Claim 1 is submitted to be allowable.

Independent Claim 5 is directed to a method, which recites an act for storing a plurality of objects via a dynamic object storage scheme. The method further recites an act for dispatching at least one of the plurality of objects via a dynamic dispatch scheme based on events from at least one of the plurality of objects. The dynamic dispatch scheme is capable of invoking an action that belongs to one of a plurality of categories. The plurality of categories includes needing one object, needing more than one object, and needing no object. The method of Claim 5 yet further recites an act for describing each of the plurality of objects utilizing an object recognition scheme. The object recognition scheme provides a description of each object of the plurality of objects. The description allows a determination of whether an object described by the description fits an application programming interface. For generally the same reasons discussed above with respect to Claim 1, applicant submits that the subject matter of Claim 5 is not taught or suggested by any of the cited and applied references, and thus, that Claim 5 is also allowable.

With respect to dependent Claims 6-8, all of which depend directly or indirectly from Claim 5, it is clear that the subject matter of these claims is also not taught or suggested by the cited and applied references, namely, Travis et al., Nagashima et al., and Vicik. Claims 6-8 all add limitations that are clearly not taught or suggested by any of the cited and applied references, particularly when the limitations are considered in combination with these recitations of the claims from which these claims individually depend. In summary, Claims 6-8 are submitted to be allowable for reasons in addition to the reason why Claim 5 is submitted to be allowable.

Independent Claim 9 is directed to a computer. The computer recites a processor, a computer-readable medium, and an asynchronous programming environment being executed by

the processor from the medium. The computer of Claim 9 further recites that the environment comprises a dynamic object storage scheme for storing a plurality of objects. The environment yet further recites a dynamic dispatch scheme based on events from at least one of the plurality of objects for invoking an action that belongs to one of a plurality of categories. The plurality of categories includes needing one object, needing more than one object, and needing no object. The environment additionally recites an object recognition scheme for providing a description of each object of the plurality of objects. The description allows a determination of whether an object described by the description fits an application programming interface. For generally the same reasons discussed above with respect to Claims 1 or 5, applicant submits that the subject matter of Claim 9 is not taught or suggested by any of the cited and applied references, and thus, that Claim 9 is also allowable.

With respect to dependent Claims 10-13, all of which depend directly or indirectly from Claim 9, it is clear that the subject matter of these claims is also not taught or suggested by the cited and applied references, namely, Travis et al., Nagashima et al., and Vicik, Claims 10-13 all add limitations that are clearly not taught or suggested by any of the cited and applied references, particularly when the limitations are considered in combination with the recitations of the claims from which these claims individually depend. In summary, Claims 10-13 are submitted to be allowable for reasons in addition to the reasons why Claim 9 is submitted to be allowable.

Independent Claim 14 is directed to a computer-readable medium that has a computer program stored thereon for execution on a computer. The computer program is recited by Claim 14 as providing an asynchronous programming environment. This environment comprises a dynamic object storage scheme for storing a plurality of objects. The environment is further recited to include a dynamic dispatch scheme based on events from at least one of the plurality of objects for invoking an action that belongs to one of a plurality of categories. The plurality of categories includes needing one object, needing more than one object, and needing no objects.

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1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

The environment as recited by Claim 14 further includes an object recognition scheme for providing a description of each object of the plurality of objects. The description allows a determination of whether an object described by the description fits an application programming interface. For generally the same reasons discussed above with respect to Claims 1, 5, or 9, applicant submits that the subject matter of Claim 14 is not taught or suggested by any of the cited and applied references, and thus, that Claim 14 is also allowable.

With respect to dependent Claims 15-19, all of which depend directly or indirectly from Claim 14, it is clear that the subject matter of these claims is also not taught or suggested by the cited and applied references, namely Travis et al., Nagashima et al., and Vicik. Claims 15-19 all add limitations that are clearly not taught or suggested by any of the cited and applied references, particularly when the limitations are considered in combinations with the recitations of the claims from which these claims individually depend. In summary, Claims 15-19 are submitted to be allowable for reasons in addition to the reasons why Claim 14 is submitted to be allowable.

The Third Request to Correct Inventorship Under M.P.E.P. § 605.04(g)

Given that the second request made by the applicant was completely ignored by the Office, the Office is again notified of a typographical or transliteration error in the spelling of the inventor's name. The incorrect inventor's name of "Slovak Ondrej Such" should read "Ondrej Such." In the originally-submitted declaration of December 21, 1998, the name of the inventor in the present patent application is set forth as "Ondrej Such." The inventor's citizenship was incorrectly set forth as "Czech Republic." The incorrect citizenship designation "Czech" was crossed out and the correct citizenship designation "Slovak" was handwritten so as to rectify the incorrect citizenship designation. The Office incorrectly interpreted, as evidenced by the filing receipt received on January 28, 1999, that the name of the inventor is "Slovak Ondrej Such." Applicant respectfully requests that this incorrect name designation be changed to the correct name designation of "Ondrej Such." More particularly, applicant respectfully requests that the

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CHRISTENSEN O'CONNOR JOHNSON KINDNESS^{PLC}
1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100

Examiner have the Technology Center's technical support staff enter the correct name designation "Ondrej Such" in the PALM database or other pertinent databases and print out a new bibliographic data sheet, which should be placed in the file wrapper of the present patent application.

CONCLUSION

In view of the foregoing remarks, applicant submits that all of the claims in the present application are clearly patentably distinguishable over the teachings of Travis et al., Nagashima et al., and Vicik. Thus, applicant submits that this application is in condition for allowance. Reconsideration and re-examination of the application and allowance of the claims and passing of the application to issue at an early date are solicited. If the Examiner has any remaining questions concerning this application, the Examiner is invited to contact the applicant's undersigned attorney at the number below.

Respectfully submitted,

CHRISTENSEN O'CONNOR
JOHNSON KINDNESS^{PLLC}



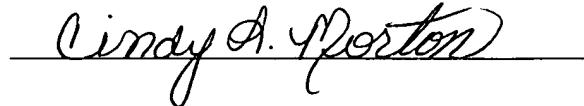
D.C. Peter Chu
Registration No. 41,676
Direct Dial No. 206.695.1636

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed envelope as first class mail with postage thereon fully prepaid and addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the below date.

Date: May 12, 2004

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LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS^{PLLC}
1420 Fifth Avenue, Suite 2800
Seattle, Washington 98101
206.682.8100